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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/752,834	01/03/01	FROOM	S 608-241

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HM12/0925

EXAMINER

OH, T

ART UNIT

PAPER NUMBER

1623

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09/25/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.

09/752,834

Applicant(s)

Froom et al

Examiner

Oh Taylor Victor

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1623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on May 14, 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☒ Claim(s) 1-15 is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some\* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 8
- 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: \_\_\_\_\_

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***Claim Rejections - 35 USC § 112***

1. Claims 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 5 on page 14, a term “--substantially--” is used. For example, the word “substantially” does not clarify how much the feedstock is freed from metallic or metal compound impurities. An appropriate correction is required.

***Claim Rejections - 35 USC § 103***

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was

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made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atkins et al (EP 0757027 A1) in view of Nishino et al's (Toku-Kai-Hei 7-71907) and Sato (U.S. 4,465,852).

Atkins et al disclose a process for the synthesis of esters by reacting an olefin such as ethylene with acetic acid ( see page 3 ,lines 45-49) in the presence of the heteropolyacid catalyst on a siliceous support derived from synthetic silica (see page 3 , lines 9-11) in a three-zone concentric tubular reactor equipped with a cooling jacket (see page 5, lines 8-15).

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Furthermore, in order to attain an optimum level of performance, the siliceous support is free of extraneous metals or elements, which might interfere with the catalytic activity of the system; the impurities in the system are less than 0.3% w/w. In the reaction mixture, the mole ratio of olefin to the lower aliphatic mono-carboxylic acid is in the range from 1:1 to 15:1, preferably from 10:1 to 14:1 (see page 3 , lines 50-52). As a result of the reaction process, the products of the reaction are recovered by fractional distillation (see page 4 , line 8).

Also, the reaction is conducted in the vapor phase above the dew point of the reactor contents with the use of the supported heteropolyacid catalyst as a fixed bed; the vapors of olefins and acids are passed over the catalyst at a GHSV in the range from 100 to 5000 per hour (see page 4 , lines 1-2). With respect to the temperature and pressure parameters, the reaction process is carried out at a temperature in the range of from 150-200<sup>0</sup> C. and at a pressure of at least 400 KPa (see page 4 , lines 4-5).

However, Atkins et al differ from the instant invention in the followings: a plurality of reactors with a plurality of catalyst beds are set up in series, the metallic or metal compound impurities are obtained from the corrosion of equipment, and the metallic or metal compound impurities are removed by using a vaporizer.

Nishino et al (Toku-Kai-Hei 7-71907) teach an apparatus of producing ethyl acetate by reacting ethylene and acetic acid in gas state in the presence of a heteropolyacid catalyst (see page

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1, a summary section) in the connected concentric three or three to five long tubes as reactors having each insulated layers of catalysts (see page 5, lines 16- 18). Furthermore, the reactors can be arranged vertically or horizontally (see page 5 , line 33).

Furthermore, Sato (U.S. 4,465,852) teach a process for the production of carboxylic acid esters by reacting olefins with carboxylic acids in the presence of a media containing a heteropolyacid (see col. 1, lines 6-16). Furthermore, in the process, various ion exchange resins can be employed so as to remove the metallic or metal compound impurities arisen from corrosion of equipment by the catalyst (see col. 1, lines 16-31).

With respect to the metallic or metal compound impurities removed by using the vaporizer, the references are silent. However, the primary Atkins et al reference does indicate the use of the distillation. The vaporizer known in the art can serve the same purpose as the distillation. Therefore, if the skillful artisan in the art had desired to purify the feed containing the metallic or metal compound impurities by means of the vaporizer as an alternative to the distillation method before the start of the reaction process, it would have been obvious for the skill artisan in the art to have used as such.

Therefore, if the skillful artisan in the art had desired to carry out the optimum number of reactors in a form of one long reactor in order to minimize any pressure variations in the reactor system as well as to increase the conversion ratio to ethyl acetate by controlling the space velocity

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rate throughout the whole apparatus, it would have been obvious for the skillful artisan in the art to have used Nishino et al's four tubular reactors in series with the Atkins et al's reactor in conjunction with Sato's ion exchange resin for the removal of impurities in the feedstock, thereby optimizing the reaction process as well as increasing the efficiency of the reaction.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Inoue et al (U.S. 5,241,106) discloses a process of producing ethyl acetate by reacting ethylene with acetic acid in the presence of a catalyst containing a tungstophosphoric acid on silica. The reaction process can be carried out in a wide range of temperature 50-500° C. at a pressure of 0-20 kg/cm<sup>2</sup>G in a gas phase. With respect to the reaction system, it is a continuous flow system.

Izumi et al (U.S. 4,205,182) discloses a process of producing an ethyl ester of an aliphatic carboxylic acid by reacting ethylene with the aliphatic carboxylic acid in the liquid in the presence of an acid catalyst such as a heteropolyacid of tungsten in the presence of water. The reaction temperature is in the range of from 130° to 300° C. whereas the reaction pressure varies from 50-300 kg/cm<sup>2</sup>.

Mesich (U.S. 3,644,497) discloses a process of producing esters and alcohols from by reacting an ethylenically unsaturated compound with a carboxylic acid in the presence of a free

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heteropolyacid of molybdenum or tungsten at a temperature of from 0 to 200° C. under a pressure of from a subatmospheric pressure to 5000 p.s.i.g.

Nakajima et al (U.S. 4,405,808) discloses a process for the preparation of an acetic acid ester by reacting acetic acid and an aliphatic lower olefin in vapor phase in the presence of steam and a catalyst such as an aromatic disulfonic acid using silica at a temperature of from 160° to 180° C. under a pressure of from atmospheric pressure to 20 kg/cm<sup>2</sup>G.

Knopf et al (U.S. 4,927,954) discloses a continuous process for producing secondary alcohols and carboxylic acid esters by mixing a long -chain  $\alpha$ -olefin with the internal olefin isomers together with a lower carboxylic acid through a reaction zone in the presence of an acidic heterogeneous catalyst in the continuous stirred tank reactor type.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to T. Victor Oh whose telephone number is (703) 305-0809. The examiner can normally be reached on Monday through Friday from 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Geist, can be reached on (703) 308-1701. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-4556.

9/18/01



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